LOCKHEED MARTIN

Lockheed Martin Idaho Technologies Company
P. O. Box 1625 Idaho Falls, ID 83415

November 4, 1997

Mr. D. Michael Gregory
Division of Environmental Quality
Enforcement Bureau
1410 N. Hilton
Boise, ID 83706-1255

TRA LISTED WASTE DETERMINATION REPORT - CRK-92-97

Dear Mr. Gregory:

Enclosed is a copy of the Test Reactor Area (TRA) Listed Waste Determination Report, which was finalized late last week. The final report confirms that less than 35 liters of listed waste entered the TRA radioactive liquid waste system historically. Because the quantity of listed waste entering the system was extremely limited relative to the normal process flows for the system, and the fact that the wastewater passes through the system on a flow-through basis, we believe it is likely that the concentrations of listed chemicals remaining in the system are either below detection or extremely low.

If you have any comments or questions, please call me at (208) 526-0078 or Tim Carlson of my staff at (208) 533-4066.

Sincerely,

Cheryl R. Koshuta, Deputy Director
Environmental Affairs Branch

TLC:lnb

Enclosure

cc: R. C. Cullison, DOE-ID, MS 1146
D. N. Rasch, DOE-ID, MS 1146

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RCRA-LISTED WASTE DETERMINATION REPORT FOR THE IDAHO NATIONAL ENGINEERING & ENVIRONMENTAL LABORATORY'S TEST REACTOR AREA

October 30, 1997

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TABLES

APPENDICES

ACRONYMS

ATR	Advanced Test Reactor
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CFR	Code of Federal Regulations
DOE-ID	Department of Energy - Idaho Office
EPA	Environmental Protection Agency
ETR	Experiment Test Reactor
ICPP	Idaho Chemical Processing Plant
INEEL	Idaho National Engineering and Environmental Test Reactor
MEK	Methyl Ethyl Ketone
MTR	Material Test Reactor
PEWE	Process Equipment Waste Evaporator
RCRA	Resource Conservation and Recovery Act
TAN	Test Area North
TRA	Test Reactor Area
WWTF	Waste Water Treatment Facility

1.0 INTRODUCTION

The Idaho National Engineering and Environmental Laboratory (INEEL), located 32 miles west of Idaho Falls, Idaho, is a government facility managed by the U.S. Department of Energy, Idaho Operations (DOE-ID). The Test Reactor Area (TRA) is located in the west-central portion of the INEEL. TRA was established in the late 1950s as a testing area for studying the effects of radiation on materials, fuels, and equipment. Three major reactors built and operated at TRA are the Materials Test Reactor (MTR), the Engineering Test Reactor (ETR), and the Advanced Test Reactor (ATR). The ATR is currently the only major reactor in operation at TRA.

To support the operation of these facilities, a radioactive liquid waste management system was developed. This system has evolved over several decades of operation, with some portions of the system commencing operation as early as 1952. Liquid waste can be managed within this network of underground pipes and holding tanks, by operating the system's valves and pumps. Since TRA generates several types of liquid wastes associated with several disposal routes, an evaluation was conducted. This evaluation was designed to determine whether Resource Conservation & Recovery Act (RCRA)-listed constituents, as defined by *Identification & Listing of Hazardous Waste: Lists of Hazardous Wastes*, 40 Code of Federal Regulations (CFR) Part 261, Subpart D, have entered TRA's radioactive liquid waste system. Once disposal routes were identified, an attempt to identify specific vessels potentially receiving the RCRA-listed constituents was made.

A good faith effort was performed to evaluate process information that would either confirm or deny existence of chemical constituents that have been discharged to TRA's radioactive liquid waste system. This report summarizes the methodology and results of this evaluation. Assignment of Environmental Protection Agency (EPA) Subpart D hazardous waste codes was based on process knowledge.

2.0 RCRA-LISTED WASTE DETERMINATION METHODOLOGY

To identify listed waste constituents that may have entered the TRA radioactive liquid waste system, numerous informational sources from 1952 onward were researched and evaluated for relevant data. The evaluation included a review of the following documentation as it relates to past and present operations at TRA.

- TRA Listed Waste Determination Survey results
- Process Knowledge (including but not limited to)
  - Liquid waste disposal system operating procedures
  - Waste management procedures
  - Unusual occurrence reports
  - Waste stream inventories
  - Waste minimization plans
- CERCLA remedial action summaries.

The investigation was initiated by the development and implementation of the TRA Listed Waste Determination Survey (referred to as 'the Survey' in subsequent sections of this report). A questionnaire was developed by TRA environmental support personnel (Attachment A). Managers covering active operations at TRA were then trained on the purpose of and the manner in which to conduct the survey. Managers then interviewed operations personnel working in their respective areas of operation and documented the responses. These responses were then provided to TRA environmental support personnel and evaluated. Any necessary clarification was obtained via follow-up interviews.

To gain additional process knowledge, historical documentation (including system operating procedures, waste management procedures, unusual occurrence reports, etc.) concerning TRA operations was reviewed. However, most of the historical documentation did not explicitly define the usage or disposal practices associated with specific chemical constituents. Therefore, when a document or procedure discussed a practice or process methodology that may have generated or involved a RCRA-listed constituent, additional investigation to ascertain pertinent details associated with that operation was made via follow-up interviews. It was determined that a systematic review of the numerous analytical laboratory methods used at TRA over the years would be of limited value, as there is no direct link between information in the documented procedures and what has been discharged to TRA's liquid radioactive waste system. This is because there is no adequate means by which to quantify the chemicals used in conjunction with the procedures, or to identify the disposal mechanisms for any wastes produced. Therefore, it was decided that relevant and pertinent data was encompassed within information obtained from the TRA Listed Waste Determination Survey results and any associated follow-up interviews.

Comprehensive Environmental Response, Compensation, & Liability Act (CERCLA) documentation associated with TRA was reviewed for contaminants of concern that could be defined as RCRA-listed substances. This documentation included notes from past discussions with TRA personnel, in addition to data associated with environmental media and tank contents that had been sampled and analyzed.

In a final effort to identify any RCRA-listed constituents that may have entered the TRA radioactive liquid waste system, interviews among former (including retired) TRA personnel were conducted. These interviews were conducted using open-ended questions relating to the individual's duties involving the use of chemical substances and any associated waste disposal practices used.

3.0 INVESTIGATION FINDINGS

3.1 Substances Associated with TRA's Radioactive Liquid Waste System

Assessment of the informational sources listed in Section 2.0, indicated that RCRA-listed substances have been discharged to the TRA radioactive liquid waste system, primarily via laboratory sink drains. A few of these substances, chemicals in pure form, were used as analytical laboratory reagents. However, the majority of the RCRA-listed substances discharged to the TRA radioactive liquid waste system were samples and sample residues that carried RCRA-listed codes associated with the sampled waste. Table 3.1 provides information concerning one-time generated RCRA-listed substances and Table 3.2 provides information concerning recirculated listed waste (see Section 5.0).

Table 3.3 identifies other potentially RCRA-listed substances that were discharged to the system. However these substances were determined not to be RCRA-listed, based on an evaluation of the usages of these substances prior to their entry into the system (see Section 4.0).

Although CERCLA documentation, associated with TRA indicated the presence of contaminants that could be defined as RCRA-related substances, a plausible connection linking the presence of these contaminants with the use/disposal of RCRA-listed substances to the TRA radioactive liquid waste system was not established.

Table 3.1 RCRA-Listed Constituents Determined to Have Entered TRA's Radioactive Liquid Waste System - One-time Generated Waste[a]

Chemical Constituent [b]	Associated EPA Hazardous Waste Number	Waste Matrix Origin	Point of Generation	Receiving Tank	Discharge Date
Trichloroethylene	F002, U228	Idaho Chemical Processing Plant (ICPP) Process Equipment Waste Evaporator (PEWE) bottom, feed, and calcine analytical samples & residues [d]	TRA-661/Lab 127	TRA-713 Hot Waste Tanks [c]	1988 to 1990
1,4-Dioxane	U108				
Acetonitrile	U003		TRA-661/ Lab 132	TRA-730 Catch Tanks	1988 to 1990
Ammonium vanadate	P119				
Aniline	U012				
Benzene	F005, U019				
Carbon disulfide	F005				
Carbon tetrachloride	F002, U211				
Chloroform	U044				
Formaldehyde	U122				
Formic acid	U123				
Hydrazine	U133				
Hydrogen fluoride	U134				
Isobutyl alcohol	F005, U140				
Lead acetate	U144				
Mercury	U151				
Methyl ethyl ketone	F005, U159				
Methyl iodide	U138				
Methylene chloride	F002, U080				
Phenol	U188				
Potassium cyanide	P098				
Pyridine	F005, U196				
Selenium dioxide	U204				
Silver cyanide	P104				
Sodium azide	P105				
Sodium cyanide	P106				

Table 3.1 RCRA-Listed Constituents Determined to Have Entered TRA's Radioactive Liquid Waste System - One-time Generated Waste[a]

Chemical Constituent [b]	Associated EPA Hazardous Waste Number	Waste Matrix Origin	Point of Generation	Receiving Tank	Discharge Date
(cont. from previous cell) 1,1,1-Trichloroethane 1,1,2-Trichloroethane Tetrachloroethylene Thiourea Toluene Vanadium oxide	 F002, U226 F002, U227 F002, U210 U219 F005, U220 P120				
Trichloroethylene	F001	TAN ground water sample	TRA-604/Lab 109	MTR Reactor Hot Drain Tank [c]	1997
Trichloroethylene	F001	TAN ground water sample analytical testing residues	TRA-604/Labs 110 & 111 TRA-661/Labs 129 & 130	MTR Reactor Hot Drain Tank [c]	1994 to 1997 1994 to 1997
Methyl ethyl ketone	F005	Extraction diluent	TRA-661/Lab 126, 128	TRA-730 Catch Tanks[c]	Historically through 1985

a. See Section 5.0

b. See explanation of substance usage and RCRA hazardous waste determination rationale in Table 4.1.

c. Prior to mid-1985 hot and warm wastes from the TRA-661 Lab were directed to TRA-730 Catch Tanks. In mid-1985, hot waste from TRA-661 Lab 127 was re-routed directly to the TRA-713 Hot Waste Tanks. In 1991, warm waste effluent from TRA-661and TRA-604 labs was re-routed through the Materials Test Reactor (MTR) Reactor Hot Drain Tank, then the MTR Warm Waste Sump Tank to the TRA-605 waste system.

d. ICPP calcine and PEWE samples, per the RCRA Part A Permit Application, have been assigned 128 EPA hazardous waste codes. The Listed Waste Determination Report, WINCO-1132, June 1993, narrowed the RCRA Part A Permit Application codes to a more applicable list of 33. Further evaluation of the Listed Waste Determination Report, is presently underway to determine if all of the 33 remaining codes are still applicable.

Table 3.2 RCRA-Listed Constituents Determined to Have Entered TRA's Radioactive Liquid Waste System - Recirculated Listed Wastes[a]

Chemical Constituent [b]	Associated EPA Hazardous Waste Number	Waste Matrix Origin	Point of Generation	Receiving Tank	Warm Waste Sampling Period
Trichloroethylene	F001,F002,U228	Evaporation Pond Inlet, ATR WWTF inlet/outlet, & TRA-605 WWTF inlet/outlet effluent samples and associated rinsates.	TRA-670/Lab 103	ATR Warm Waste Tank [c]	1994 to1997
1,4-Dioxane	U108				
Acetonitrile	U003		TRA-604/Lab 112	MTR Reactor Hot Drain Tank [c]	1994 to 1996
Ammonium vanadate	P119				
Aniline	U012				
Benzene	F005, U019				
Carbon disulfide	F005				
Carbon tetrachloride	F002, U211				
Chloroform	U044				
Formaldehyde	U122				
Formic acid	U123				
Hydrazine	U133				
Hydrogen fluoride	U134				
Isobutyl alcohol	F005, U159				
Lead acetate	U144				
Mercury	U151				
Methyl ethyl ketone	F005, U159				
Methyl iodide	U138				
Methylene chloride	F002, U080				
Phenol	U188				
Potassium cyanide	P098				
Pyridine	F005, U196				
Selenium dioxide	U204				
Silver cyanide	P104				
Sodium azide	P105				
Sodium cyanide	P106				

Table 3.2 RCRA-Listed Constituents Determined to Have Entered TRA's Radioactive Liquid Waste System - Recirculated Listed Wastes[a]

Chemical Constituent [b]	Associated EPA Hazardous Waste Number	Waste Matrix Origin	Point of Generation	Receiving Tank	Warm Waste Sampling Period
(cont. from previous cell)					
1,1,1-Trichloroethane	F002, U226				
1,1,2-Trichloroethane	F002, U227				
Tetrachloroethylene	F002, U210				
Thiourea	U219				
Toluene	F005, U220				
Vanadium oxide	P120				
1,4-Dioxane	U108	Evaporation Pond/Warm Waste Inlet, ATR WWTF inlet/outlet, &	TRA-670/Lab 103	ATR Warm Waste Tank[c]	1988 to 1994
Acetonitrile	U003				
Ammonium vanadate	P119	TRA-605 WWTF inlet/outlet	TRA-604/Lab 112	TRA-730 Catch Tanks	1988 to 1991
Aniline	U012	effluent samples and associated		MTR Reactor Hot Drain Tank[c]	1991 to 1994
Benzene	F005, U019	rinsates.[d]			
Carbon disulfide	F005				
Carbon tetrachloride	F002, U211				
Chloroform	U044				
Formaldehyde	U122				
Formic acid	U123				
Hydrazine	U133				
Hydrogen fluoride	U134				
Isobutyl alcohol	F005, U140				
Lead acetate	U144				
Mercury	U151				
Methyl ethyl ketone	F005, U159				
Methyl iodide	U138				
Methylene chloride	F002, U080				
Phenol	U188				
Potassium cyanide	P098				
Pyridine	F005, U196				

Table 3.2 RCRA-Listed Constituents Determined to Have Entered TRA's Radioactive Liquid Waste System - Recirculated Listed Wastes[a]

Chemical Constituent [b]	Associated EPA Hazardous Waste Number	Waste Matrix Origin	Point of Generation	Receiving Tank	Warm Waste Sampling Period
(cont. from previous cell)					
Selenium dioxide	U204				
Silver cyanide	P104				
Sodium azide	P105				
Sodium cyanide	P106				
1,1,1-Trichloroethane	F002, U226				
1,1,2-Trichloroethane	F002, U227				
Tetrachloroethylene	F002, U210				
Thiourea	U219				
Toluene	F005, U220				
Vanadium oxide	P120				
Methyl ethyl ketone	F005	Warm Waste Pond Inlet samples and associated rinsates[e]	TRA-670/Lab 103 TRA-604/Lab 112	ATR Warm Waste Tank [c] TRA-730 Catch Tanks[c]	Historically through 1988

a. See Section 5.0

b. See explanation of substance usage and RCRA hazardous waste determination rationale in Table 4.1.

c. Effluents treated in the TRA-605 radioactive liquid waste system are routed to the TRA Evaporation Pond after treatment. Samples are obtained from the TRA evaporation pond inlet on both a weekly and daily basis and are analyzed in TRA-670 Lab 103 and TRA-604 Lab 112. Remaining samples or rinsates disposed via the TRA-670 Lab 103 drain are discharged to the ATR Warm Waste Tank and then downstream to the warm waste system. Remaining samples or rinsates disposed via the TRA-604 Lab 112 drain are discharged to the MTR Reactor Hot Drain Tank, the MTR Warm Waste Sump, and then to the TRA-605 liquid waste system. Prior to 1991 these were discharged dirctly to the TRA-730 Catch Tanks. Thus, contaminants' RCRA-listed waste codes are applicable to the liquid effluent piping systems that connect the labs to their respective receiving vessels and warm waste treatment system.

d. In 1992 the Warm Waste Pond was removed from service and the new TRA Evaporation Pond was put into service.

e. The ATR and TRA-605 Warm Wast Treatment Facilities were installed in 1986. Prior to that date, warm waste from TRA-670 and TRA 604 passed untreated through downstream systems to the Warm Waste Pond.

Table 3.3 Substances Determined Not to have Impacted the TRA Radioactive Liquid Waste System's RCRA Determination[a]

Substance	Waste Origin	Source	Receiving Tank	Dates
Acetone	Dissolution of Solids	TRA-670 / Lab 103	ATR Warm Waste Tank[b]	1987 to 1989
Acetone	Clean/Dry Glassware	TRA-670 / Labs 103, 124, 131	ATR Warm Waste Tank[b]	1976 to 1995
Acetone	Clean/Dry Glassware	TRA-604 / Labs 110, 111	TRA-730 Catch Tanks	Historically through 1985
Acetone	Clean/Dry Glassware	TRA-661 / Labs 126, 127, 128	TRA-730 Catch Tanks	Historically through 1985
Carbon Tetrachloride	Extraction Diluent	TRA-604 / Labs 110, 111	TRA-730 Catch Tanks	Historically through 1985
Carbon Tetrachloride	Extraction Diluent	TRA-661 / Labs 126, 127, 128	TRA-730 Catch Tanks	Historically through 1985
Chloroform	Extraction Diluent	TRA-604 / Labs 110, 111	TRA-730 Catch Tanks	Historically through 1985
Chloroform	Extraction Diluent	TRA-661 / Labs 126, 127, 128	TRA-730 Catch Tanks	Historically through 1985
Methanol	Remove Solids from Filters	TRA-670 / Labs 103, 124, 131	ATR Warm Waste Tank[b]	1976-1983
Methanol	Clean/Dry Glassware	TRA-604 / Labs 110, 111	TRA-730 Catch Tanks	Historically through 1985
Methanol	Clean/Dry Glassware	TRA-661 / Labs 126, 127, 128	TRA-730 Catch Tanks	Historically through 1985
Methanol	Microbial Biocide	TRA-670 / Lab 103	ATR Warm Waste Tank[b]	1995
Methanol	Clean/Dry Glassware	TRA-670 / Lab 103	ATR Warm Waste Tank[b]	1976 to 1995
Xylene	Extraction Diluent	TRA-604 / Labs 110, 111	TRA-730 Catch Tanks	Historically through 1985
Xylene	Extraction Diluent	TRA-661 / Labs 126, 127, 128	TRA-730 Catch Tanks	Historically through 1985

a. See explanation of substance usage and RCRA hazardous waste determination rationale in Section 4.0.
b. Any remaining samples or rinsates disposed via the TRA-670 Lab 103, 124, & 131 drains are discharged to the ATR Warm Waste Tank and the downstream warm waste system.

4.0 RCRA DETERMINATIONS

A summary of the RCRA determination rationale for each RCRA-listed substance associated with the TRA Radioactive Liquid Waste System is provided on the following pages.

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
Trichloroethylene	During the years 1988 to 1990 radiochemical analysis was performed on ICPP PEWE bottom, feed, and calcine samples. The samples and associated waste were disposed via the hot drain in TRA-661 Lab 127 to the TRA-713 Hot Waste Tanks and the warm drains in TRA-661, Lab 132 to the TRA-730 Catch Tanks. It is estimated that approximately 6.5 liters of sample and sample waste were disposed in this manner.	In 1990, ICPP's liquid mixed waste was categorized as a RCRA-listed. Samples and sample residues have been classified as: F001, F002, U228
1,4-Dioxane		U108
Acetonitrile		U003
Ammonium vanadate		P119
Aniline		U012
Benzene		F005, U019
Carbon disulfide		F005
Carbon tetrachloride		F002, U211
Chloroform		U044
Formaldehyde		U122
Formic acid		U123
Hydrazine		U133
Hydrogen fluoride		U134
Isobutyl alcohol		F005, U140
Lead acetate		U144
Mercury		U151
Methyl ethyl ketone		F005, U138
Methyl iodide		F005, U159
Methylene chloride		U138
Phenol		U188
Potassium cyanide		P098
Pyridine		F005, U196
Selenium dioxide		U204
Silver cyanide		P104
Sodium azide		P105
Sodium cyanide		P106
Tetrachloroethylene		F002, U210

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
(cont. from previous cell) Thiourea Toluene Vanadium oxide 1,1,1-Trichloroethane 1,1,2-Trichloroethane		 U219 F005, U220 P120 F002, U226 F002, U227
Trichloroethylene	From 1994 to 1997, radiochemical analysis was performed on samples of INEEL's Test Area North (TAN) groundwater. During the time frame 1994 to 1997, sample residues were disposed via drains in TRA-604 Labs 109, 110, &, 111 and TRA-661 Labs 129 & 130. In 1997, unused samples were disposed of in TRA-604 Lab 109. From the drains, the discharge went through the MTR Reactor Hot Drain Tank, the MTR Warm Waste Sump, and to the TRA-605 Waste System. It is estimated that approximately 27 liters of sample and sample residues were disposed in this manner.	In 1997, the TAN groundwater was declared to be RCRA-listed. Samples and sample residues have been classified as: F001

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
Trichloroethylene 1,4-Dioxane Acetonitrile Ammonium vanadate Aniline Benzene Carbon Disulfide Carbon Tetrachloride Chloroform Formaldehyde Formic acid Hydrazine Hydrogen fluoride Isobutyl alcohol Lead acetate Mercury Methyl ethyl ketone Methyl iodide Methylene chloride	Evaporation Pond Inlet, ATR WWTF inlet/outlet, & TRA-605 WWTF inlet/outlet effluent samples were analyzed in TRA-670/Lab 103 and TRA-604/Lab 112, generating leftover samples, sample residues, and associated rinsates. The samples were disposed via laboratory drains to the ATR Warm Waste Tank and MTR Reactor Hot Drain Tank, respectively. As of 1994, the warm waste system had received RCRA listed wastes, specifically those associated with the TAN groundwater samples/ sample residuals, the MEK diluent waste, and the ICPP PEWE calcine, bottoms, and feed samples and associated residues. It is estimated that 1300 liters of RCRA-listed wastes were discharged annually in this manner from 1994 to the present.	In 1997, the TAN groundwater samples and sample residuals were categorized as a RCRA-listed waste. Combined with the ICPP PEWE calcine, bottom, & feed samples (and the associated sample residues) discharged to the system in 1988 to 1990, and the MEK that was discharged to the system historically until 1985, these effluent samples and sample residues have been classified as: F001, F002, U228 U108 U003 P119 U012 F005, U019 F005 U211 U044 U122 U123 U133 U134 F005, U140 U144 U151 F005, U159 U138 F002, U080

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
(cont. from previous cell)		
Phenol		U188
Potassium cyanide		P098
Pyridine		F005, U196
Selenium dioxide		U204
Silver cyanide		P104
Sodium azide		P105
Sodium cyanide		P106
Tetrachloroethylene		F002, U210
Thiourea		U219
Toluene		F005, U220
Vanadium oxide		P120
1,1,1-Trichloroethane		F002, U226
1,1,2-Trichloroethane		F002, U227

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
Trichloroethylene 1,4-Dioxane Acetonitrile Ammonium vanadate Aniline Benzene Carbon disulfide Carbon tetrachloride Chloroform Formaldehyde Formic acid Hydrazine Hydrogen fluoride Isobutyl alcohol	Evaporation Pond Inlet, ATR WWTF inlet/outlet, & TRA-605 WWTF inlet/outlet effluent samples gemerating leftover samples, sample residues, and associated rinsates were analyzed in TRA-670/Lab 103 and TRA-604/Lab 112.[a] The samples from TRA-670 were disposed of to the ATR Warm Waste Tank. Samples from TRA-604 were disposed of to the MTR Reactor Hot Drain Tank after 1991 and to the TRA-730 Catch Tanks prior to this date. From 1988 to 1994, the warm waste had received RCRA listed wastes, specifically those associated with the MEK diluent waste, and the ICPP PEWE calcine, bottoms, and feed samples and associated sample residues. It is estimated that 1300 liters of RCRA-listed wastes were discharged annually in this manner from 1988 to 1994.	In 1990, the ICPP PEWE calcine, bottoms, & feed samples and associated sample residues were categorized as a RCRA-listed waste. Combined with the MEK that was discharged to the system historically until 1985, the effluent samples and sample residues have been classified as: F002, U228 U108 U003 P119 U012 F005, U019 F005 F002, U211 U044 U122 U123 U133 U134 F005, U140

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
(cont. from previous cell)		
Lead acetate		U144
Mercury		U151
Methyl ethyl ketone		F005, U159
Methyl iodide		U138
Methylene chloride		F002, U080
Phenol		U188
Potassium cyanide		P098
Pyridine		F005, U196
Selenium dioxide		U204
Silver cyanide		P104
Sodium azide		P105
Sodium cyanide		F002, U226
Tetrachloroethylene		F002, U227
Sodium azide		P105
Tetrachloroethylene		F002, U210
Thiourea		U219
Toluene		F005, U220
Vanadium oxide		P120
1,1,1-Trichloroethane		F002, U226
1,1,2-Trichloroethane		F002, U227

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
Methyl ethyl ketone	Warm Waste Pond Inlet, ATR WWTF inlet/outlet, & TRA-605 WWTF inlet/outlet effluent samples and associated rinsates were analyzed in TRA-670/Lab 103 and TRA-604/Lab 112.[b] The samples were disposed via laboratory drains to the ATR Warm Waste Tank and MTR Reactor Hot Drain Tank, respectively. From 1952 to 1988, these warm wastes had received RCRA-listed wastes, specifically those associated with the MEK diluent waste. It is estimated that 300 liters of recirculated RCRA-listed wastes were discharged annually in this manner from 1952 to 1986, and 1300 liters of recirculated RCRA-listed wastes were discharged annually in this manner from 1986 to 1988.	Historically to 1985, MEK was being used as a diluent and then disposed down the laboratory drain. The sample waste is considered to be RCRA-listed and has been classified as F005.
Methyl ethyl ketone	This substance was used as a diluent, facilitating the dissolution of reagents into solution during actinide analyses. Up to 1985, the used substance was disposed via laboratory drains to TRA-730 Catch Tanks. It is estimated that historically to 1985, no more than 1 liter of methyl ethyl ketone were disposed in this manner.	The waste methyl ethyl ketone (MEK) is considered to be a solvent and carries the RCRA-listed code F005.

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
Acetone	Acetone was used in concentrations >10% to dry laboratory glassware (used in TRA-670 Labs 103, 124, 131; TRA-604 Labs 110, 111; & TRA-661 Labs 126, 127, 128) and to dissolve and remove solids from sieves (TRA-670 Lab 103). Following these uses the acetone was disposed to a sink drain, where water would then be used to rinse the remaining acetone from the glassware and filters. The discharge from TRA-670 labs went to the ATR Warm Waste Tank and to the downstream warm waste system. The discharge from TRA-604 and TRA-661 labs went to the MTR Reactor Hot Drain Tank, the MTR Warm Waste Sump Tank, and then to the TRA-605 Waste System after 1991, and to the TRA-730 Catch Tanks prior to 1991. It is estimated that from 1976 to 1995, no more than approximately 2-3 liters of acetone were disposed of in this manner.	Waste acetone is considered to have been used for its solvent properties at the point of generation. However, when mixed with water it lost its characteristic of ignitability. Thus, this mixture is not considered to be RCRA-listed, due to acetone being F-listed based only on its characteristic of ignitability [40 CFR 261.3 (a)(2)(iii)].
Carbon tetrachloride	This substance was used as a diluent, facilitating the dissolution of reagents into solution during actinide and iodine analyses. Historically through 1985 the used carbon tetrachloride was disposed via laboratory drains in TRA-604 Labs 110, 111; & TRA-661 Labs 126, 127, 128. The discharge from TRA-604 and TRA-661 labs went to the TRA-730 Catch Tanks. It is estimated that until 1985, no more than 2 liters of carbon tetrachloride were disposed in this manner.	Used in this application, this substance is considered to be a solvent. However, in this application the carbon tetrachloride does not carry a RCRA-listed code, because it was not used for degreasing (40 CFR 261.31).

Table 4.1 Potential RCRA-Listed Substances Identified at TRA

Chemical Constituent	Summary Comment	Regulatory Conclusion
Methanol	Methanol was used in concentrations >10% to clean laboratory glassware in TRA-604 Labs 110, 111; & TRA-661 Labs 126, 127, 128 and to dissolve and remove solids from sieves in TRA-670 Labs 103, 124, 131. Following these uses the methanol was disposed to a sink drain. Water was then used to rinse the remaining methanol from the glassware and filters. The discharge from TRA-670 labs went to the ATR Warm Waste Tank and the downstream warm waste system. The discharge from TRA-604 and TRA-661 labs went to the TRA-730 Catch Tanks. It is estimated that until 1985, no more than 2-3 liters of methanol were disposed in this manner. Methanol was also used as a microbial biocide to eliminate microbial growth in ion exchange columns. The substance was mixed with water, run through the columns, and disposed of directly to a sink drain located in TRA-670 Lab 103. The discharge was sent to the ATR Warm Waste Tank and then to a downstream warm waste system. It is estimated that in 1995, no more than 0.120 liters of methanol were disposed in this manner.	In the instances of cleaning glassware and dissolving material off filters, the methanol is considered to have been used for its solvent properties at the point of generation. However, when mixed with water it lost its characteristic of ignitability. Thus, this mixture is not considered to be RCRA-listed, due to methanol being F-listed based only on its characteristic of ignitability [40 CFR 261.3 (a)(2)(iii)]. Usage of methanol as a biocide is not considered to be a RCRA-listed use, because the methanol was not used for its solvent properties.
Xylene	This substance was used as a diluent, facilitating the dissolution of reagents into solution during actinide analyses. Historically through 1985, the used substance was diluted with water and disposed via laboratory sink drains located in TRA-604 Labs 110, 111; & TRA-661 Labs 126, 127, 128. It went to the TRA-730 Catch Tanks. It is estimated that historically through 1985, no more than 2 liters of xylene were disposed in this manner.	In this instance, xylene is considered to have been used for its solvent properties at the point of generation. However, when mixed with water it lost its characteristic of ignitability. Thus, this mixture is not considered to be RCRA-listed, due to xylene being F-listed based only on its characteristic of ignitability [40 CFR 261.3 (a)(2)(iii)].

a. In 1992 the TRA Evaporation Pond replaced the Warm Waste Pond. Prior to this date, samples were collected from the Warm Waste Pond Inlet.
b. The ATR WWTF and TRA-605 WWTF were installed in 1986. Therefore, samples were collected from these units from 1986 forward.

5.0 CONCLUSIONS

Based on this results of this investigation, it has been determined that RCRA-listed substances have been disposed to the TRA Radioactive Liquid Waste System. For the purposes of this report, the RCRA-listed substances discharged to the system have been classified into two groups:

1) One-time generated RCRA-listed wastes are as follows:

- RCRA-listed samples that originated outside of TRA
- Wastes generated from the analysis of RCRA-listed samples originating outside of TRA
- RCRA-listed wastes generated at TRA.

The volume of one-time generated RCRA-listed wastes that was discharged to TRA's Radioactive Liquid Waste System is estimated as follows:

• Waste from dissolution of a 2-gram ICPP Calcine sample		5.50 L
• ICPP Bottoms samples and associated analytical waste		0.10 L
• ICPP Feed samples and associated analytical waste		0.74 L
• MEK diluent waste		1.00 L
• TAN groundwater samples and associated analytical waste		27.00 L
	Total	34.34 L

Based on the quantities discharged over known periods of time, it has been estimated that a maximum of 35 liters of one-time generated listed wastes have been discharged historically to the Radioactive Liquid Waste System.

2) Recirculated RCRA-listed wastes -

- TRA Radioactive Liquid Waste System effluent samples, that are RCRA-listed due to the disposal of one-time generated RCRA-listed wastes.

The volume of recirculated RCRA-listed wastes that was discharged to TRA's Radioactive Liquid Waste System via laboratory warm waste drains is estimated as follows:

- Prior to 1986 Warm Waste Pond Inlet effluent and associated rinsates samples were annually 300L
- Evaporation Pond/Warm Waste Pond Inlet, ATR/TRA-605 WWTF inlet/outlet effluent samples and associated rinsates were annually 1300L

APPENDIX A

TRA LISTED WASTE DETERMINATION SURVEY QUESTIONNAIRE FORM

TANK CHARACTERIZATION PROJECT

GENERAL INFORMATION and CHARACTERISTIC WASTE SECTIONS:

Date of interview: Interviewer:

Facility Contact(s) Interviewed:
1.

2.

3.

4.

Building: Room(s) Responsible Party if different from contact:

Complete the following questionnaire to the best of your knowledge. The laboratory or facility manager or their designee is responsible for signing this document. Your signature certifies that the information on this form and the attachments is true and accurate. You have put forth a good faith effort to acquire and verify the information, and that any willful or deliberate omissions have not been made.

1. Complete the attached Waste Generation Table for all waste streams (both hazardous and nonhazardous) that are discharged to a TRA tank system or surface impoundment? Include both wastes generated in the past and wastes that are continuing to be generated.

2. Have you completed a RCRA hazardous waste determination in accordance with MCP 444 , 40 CFR 262.11, and TRA's Waste Management Authority (WMA) for each waste stream generated and discharged to a TRA tank system or surface impoundment? YES NO Some waste streams but not all.

   a. For all waste streams for which a hazardous waste determination is complete, ensure that all sections of the Waste Generation Table are completed for this waste stream. NOTE: It is not uncommon for a waste stream to have more than one EPA waste code associated with it. Be sure to identify all applicable EPA waste codes for each waste stream.

   b. If yes, where do you keep your hazardous waste determination documentation?

   c. If no, identify which waste streams have not been assessed in accordance with these requirements.

   Note: If no, you will have to complete a hazardous waste determination in accordance with MCP 444. The first step in this process will be completing this document, the attached tables, and notifying TRA's WMA. Contact Kent Miller, Environmental Support for help in completing this document.

   d. Do you generate and dispose to a TRA tank system or surface impoundment waste streams that meet any of the following EPA waste classifications (at the point of generation): YES NO

   NOTE: If yes, be sure to identify all EPA waste codes that apply to each waste stream on the Waste Generation Table. (i.e., an ignitable waste (D001) contains 500 ppm MEK, this waste stream would have the following EPA waste codes: D001; and a D035.)

PARTIAL LISTING OF RCRA CHARACTERISTIC WASTES SUBJECT TO 40CFR 268.48

D001. Ignitability (See 40 CFR 262.21 for definitions);
D002, Corrosivity (See 40 CFR 262.22 for definitions);
D003, Reactivity (See 40 CFR 262.23 for definitions);
D018, Benzene ≥ .5 ppm;
D019, Carbon Tetrachloride≥.5 ppm;
D020, Chlordane, ≥0.03 ppm;
D021, Chlorobenze, ≥ 100 ppm;
D022, Chloroform, ≥ 6 ppm;
D023, o-Cresol, ≥ 200 ppm;
D024, m-Cresol, ≥ 200 ppm;
D025, p-Cresol, ≥ 200 ppm;
D026, CRESOL, ≥ 200 ppm;
D027, 1,4-Dichlorobenzene ≥ 7.5 ppm;
D028. 1,2-Dichloroethane ≥ 0.5 ppm;
D029, 1,1-Dichloroethylene ≥ 0.7 ppm;
D030, 2,4-Dinitrotoluene ≥ 0.13 ppm;
D031, Heptachlor, ≥ 0.008 ppm;
D032, Hexachlorobenzene, ≥ 0.13 ppm;
D033, Hexachlorobutadiene, ≥ 0.5 ppm;
D034, Hexachlorethane, ≥ 3.0 ppm;
D035, Methyl ethyl ketone, ≥ 200 ppm;
D036, Nitrobenzene, ≥ 2.0 ppm;
D037, Pentachlorophenol, ≥ 100 ppm;
D038, Pyridine, ≥ 5.0 ppm;
D039, Tetrachloroethylenehylene ≥ 0.7 ppm
D040, Trichloroethylene, ≥ 0.5 ppm;
D041, 2,4,5-Trichlorophenol, ≥ 400 ppm;
D042, 2,4,6-Trichlorophenol, ≥ 2.0 ppm;
D043, Vinyl chloride, ≥ 0.2 ppm.

3. If you answered YES to question 2 above, turn to the attached Table titled, "40 CFR Protection of Environment, Section 268.48 Universal Treatment Standards located at the very end of this document. Please identify all constituents of concern that you could reasonably expect to be present in your waste stream by high lighting all applicable constituents. If you determine that your waste stream does not have underlying hazardous constituents, mark this section NA and attach documention to support this assessment.

Applicable (fill out 40 CFR 268.48 Table for UHC) Not Applicable (attach documentation)

NOTE: Underlying hazardous constituents apply only to those waste streams identified in question #2.

4. Complete the Facility Drains Table for those waste streams generated on-site and disposed of in either a TRA tank system or surface impoundment:

LISTED WASTE QUESTIONNAIRE

If you answer YES, to any of the questions included in the Listed Waste Questionnaire be sure that all sections of the Waste Generation Table are completed for those waste streams. This Table requires the following information:

Describe the generating process;
Identify the chemicals and or products used; include CAS#, if known;
EPA Waste Codes
Identify if the waste is mixed or not;
Was the waste treated prior to disposal to a tank system or impoundment:
What time frame (date) were these materials used and subsequently disposed of to these systems?; and
What tank system or surface impoundment was this materials disposed to?

LISTED WASTE: NON-SPECIFIC SOURCES

1. Were any halogenated or non-halogenated chemicals or commercial products containing these chemicals, as identified in the following list, used and disposed to a waste tank system or surface impoundment? (i.e., warm waste pond, cold waste pond, chemical leaching pond, sanitary waste)

YES NO

b. In addition to completing the Waste Generation Table, identify at what concentrations were these chemicals used?

LIST OF HALOGENATED AND NON-HALOGENATED CHEMICALS OF CONCERN:

Halogenated Chemicals:	CAS #:
Tetrachloroethylene,	127-18-4
Trichloroethylene,	79-01-6
Methylene chloride,	75-09-2
1,1,1-trichloroethane,	71-55-6
Carbon tetrachloride,	56-23-5
chlorinated fluorocarbons,	
Chlorobenzene,	108-90-7
1,1,2-trichloro-1,2,2-trifluoroethane,	76-13-1
Ortho-dichlorobenzene,	95-50-1
Trichlorofluoromethane,	75-69-4
1,1,2-trichloroethane.	79-00-5

Non-Halogenated Chemicals:	
Toluene,	108-88-3
Methyl ethyl ketone, (2-butanone)	78-93-3
Carbon disulfide,	75-15-0
Isobutanol, (isobutyl alcohol)	78-83-1
Pyridine,	110-86-1
Benzene,	71-43-2
2-ethoxyethanol,	110-80-5
(ethylene glycol monoethyl ether)	
2-nitropropane.	79-46-9
Cresols, (methyl phenol)	1319-77-3
Cresylic acid, and	1319-77-3
Nitrobenzene	98-95-3

Non-Halogenated Chemicals Listed for Flammability Only:	
Xylene,	1330-20-7
Acetone,	67-64-1
Ethyl acetate,	141-78-6
Ethyl benzene,	100-41-4
Ethyl ether,	60-29-7
Methyl isobutyl ketone,	108-10-1
n-butyl alcohol,	71-36-3
Cyclohexanone, and	108-94-1
Methanol.	67-56-1

Note: Commercial products may contain these chemicals as part of their formulation, for example, certain TURCO products contain TCE, certain oil based paints contain MEK. Although such materials do not meet the listed waste criteria, they need to be identified on this form. Environmental Support will evaluate the data supplied and help the generator determine if the material meets the RCRA listed waste definition using the information on this sheet.

LISTED WASTE: COMMERCIAL CHEMICAL PRODUCTS

2. Have you ever disposed of unused or off-specification unused commercial chemical products to a waste tank system or surface impoundment?

   YES NO

   Note: Commercial chemical product refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercial pure grade of the chemical, any technical grades that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. (It does not refer to manufacturing process wastes that contain those substances.)

LISTED WASTE: ELECTROPLATING OPERATIONS

3. Have you ever conducted electroplating operations and disposed of wastes or plating baths from these processes to a waste tank system or surface impoundment?

   YES NO

LISTED WASTE: ANODIZING OPERATIONS

4. Have you ever conducted aluminum anodizing operations in this area and disposed of these wastes to a waste tank system or surface impoundment?

   YES NO

Date: Person Interviewed: Job Title:

Signature of facility manager, laboratory manager, or their designee:

Your signature certifies that the information on this form and the attachments is true and accurate. You have put forth a good faith effort to acquire and verify the information, and that any willful or deliberate omissions have not been made.